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**ABSTRACT**

**Summary**

A title management and playback method of a high density optical disc records and manages a title file  
5 associated with clip files of a data stream recorded and stored on the high density optical disc, and records and manages navigation information for a random or shuffle playback of the title file. Therefore, the data stream of the title files recorded and managed in the high density  
10 optical disc can be variously reproduced through the random/shuffle playback.

**Key Figure**

FIG. 7

**Key Words**

15 blu-ray disc (BD)-ROM, random/shuffle playback, playlist, segment, random/shuffle mark, random/shuffle unit

**SPECIFICATION**

**Title**

TITLE MANAGEMENT AND PLAYBACK METHOD OF HIGH DENSITY OPTICAL  
DISC

5

**Brief Description Of The Drawings**

FIG. 1 illustrates a BD-RE file structure,

FIG. 2 illustrates associations between PlayList  
files, and Clip Info files and Clip files of the BD-RE,

10 FIG. 3 illustrates a title file recorded and managed  
in a BD-ROM to which the present invention is applied,

FIG. 4 illustrates associations of Title file,  
PlayList files, Clip Info files, and Clip files of the BD-  
ROM to which the present invention is applied,

15 FIG. 5 illustrates a BD-ROM file structure to which  
the present invention is applied,

FIG. 6 illustrates a simplified construction of an  
optical disc device to which the present invention is  
applied,

20 FIGS. 7 and 10 illustrate examples of navigation  
information for random/shuffle playback recorded and  
managed according to the present invention.

**Major Elements In Drawings**

25	10: optical disc	11: optical pickup
	12: VDP system	13: micom
	14: memory	

**Background Of The Invention**

30 The present invention relates to a title management  
and playback method of a high density optical disc such as

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blu-ray disc (BD)-ROM.

In recent, standardization has been processing with rapid advance in relation with a new rewritable high density optical disc, such as BD-rewritable (BD-RE), which can store high definition video data and high quality audio data for a long time. Accordingly, it is expected that related products will be developed and become commercially available on the market.

10           Meanwhile, a BD-RE file structure is shown in FIG. 1. The DVR directory is placed under the Root directory at the top. Under the DVR directory, info.dvr file, menu.tidx file, mark.tidx file and the like are placed. Under the DVR directory, the PLAYLIST directory to which a plurality of  
15   playlist files (\*.rpls, \*.vpls) are added and recorded, the CLIPINF directory to which a plurality of clip information files (\*.clpi) are added and recorded, and the STREAM directory to which a plurality of clip files corresponding to the clip information files, that is, A/V streams of  
20   MPEG2 transport stream format are added and recorded are placed.

          Playback control information relating to the clip files recorded in the STREAM directory, for example, 01001.m2ts file and 02000.m2ts file can be recorded and  
25   stored to 01001.clpi file and 02000.clpi file, respectively, in the CLIP directory. Playlist information to determine the continuous playback and the playback order in association with 010001.m2ts file and 02000.m2ts file can be recorded and stored to 01001.rpls file which is  
30   contained in the PLAYLIST directory.

          Meanwhile, as shown in FIG. 2, an A/V stream recorded and stored on the BD-RE, for example, a clip A/V stream recorded and stored by unit of clip with the temporal

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continuity is recorded, reproduced and managed by a Real PlayList of the BD-RE, a Virtual PlayList set by a user's editing, and a Clip Info File.

An optical disc device to read and reproduce the A/V stream recorded and stored on the BD-RE performs a series of reproduction operations to read and reproduce the clip A/V stream which is managed in association with the Real PlayList, the Virtual PlayList, and the Clip Info File.

Recently, development and standardization is under way for a high density optical disc such as BD-ROM. The clip A/V Streams associated with the Real PlayList and the Virtual PlayList are multi-titles having different playback orders from one another. Yet, there is no efficient solution to not only control the reproduction but also variously output the A/V streams recorded and managed on the BD-ROM through random/shuffle playback. Thus, urgent demand arises for such a solution.

[Technical object of the invention]

The present invention has been provided to address the above-mentioned and other problems and disadvantages occurring in the conventional arrangement, and an aspect of the present invention is to provide a title management and playback method of a high density optical disc for controlling to reproduce clip A/V streams recorded and stored on the high density optical disc such as BD-ROM, as multi-title having different playback orders from one another, and for variously outputting the reproduction and efficiently through random/shuffle playback.

**Explanation Of The Invention**

According to the aspect of the present invention, a title management method of a high density optical disc

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records and manages a title file associated with clip files of a data stream recorded and stored on the high density optical disc, and also records and manages navigation information for a random or shuffle playback of the title  
5 file.

According to another aspect of the present invention, a title playback method of a high density optical disc, includes a first operation of reading and confirming navigation information for a random or shuffle playback of  
10 a title file on the high density optical disc; and a second operation of performing the random or shuffle playback of a data stream of the title file by referring to the navigation information.

According to another aspect of the present invention,  
15 a high density optical disc stores a title file associated with clip files of a data stream recorded and stored on the high density optical disc, and navigation information for a random or shuffle playback of the title file.

20 Hereafter, the title management and playback method of the high density optical disc according to certain exemplary embodiments of the present invention will now be described in greater detail with reference to the accompanying drawings.

25 First, the title management and playback method of the high density optical disc according to an embodiment of the present invention, is applicable to a disc manufacturing process to author the high density optical disc such as BD-ROM, and an optical disc player which  
30 reproduces the high density optical disc such as BD-ROM.

The title management method of the high density optical disc according to an embodiment of the present invention, as shown in FIG. 3, records and manages the A/V

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streams recorded and stored on the BD-ROM as a plurality of clips 1, 2, ..., and records and manages playlists associated with the clip files, for example, the Real PlayList and the Virtual PlayList.

5        Also, segments are newly defined in association with the playlists, and various multi-titles having different continuous playback orders from one another with respect to the plurality of segments are recorded and managed.

10        The playlists associated with the clip files of the A/V streams are managed at a playlist layer level. The multi-titles having the continuous playback orders set differently with respect to the segments associated with the playlists are separately managed at a title playback control layer.

15        Referring to FIG. 3, the Title #1 defines the continuous playback order of the plurality of segments. There can be a plurality of Segments 2 and 3 having a branch structure, and a plurality of Segments 5, 6, and 7 having a multi-path structure.

20        The Segment 2 and the Segment 3 having the branch structure are associated with a PlayList 2 and a PlayList 3, respectively, which are different from each other. The PlayList 2 controls the reproduction of the entire A/V stream of the Clip file 3, and the PlayList 3 controls the  
25        reproduction of part of the A/V stream of the Clip file 3.

      The Segment 5, the Segment 6, and the Segment 7, in the multi-path structure, are associated with different playlists of a PlayList 5, a PlayList 6, and a PlayList 7, respectively. The A/V stream associated with the PlayList 5,  
30        the A/V stream associated with the PlayList 6, and the A/V stream associated with the PlayList 7 can be recorded and managed for Korea, U.S.A., and Japan, respectively.

      As shown in FIG. 3, the Title #2 may be recorded and



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managed as a second title of the Title #1 or a separate title. The Title #2 may contain Segments 2, 3, and 4 in the branch structure, and Segments 5, 6, and 7 in the multi-path structure. The playlists associated with the Title #1  
5 can be doubly associated to the Title #2. Alternatively, certain playlists may be newly associated only to the Title #2.

The plurality of segments in the Title #2 can record the continuous playback order and the playback control  
10 information by a program such as Java Scriptor. The plurality of segments in the Title #1 can record the continuous playback order and the playback control information by a command. A title for reproducing the general A/V data may be separately managed as a core  
15 profile title, and a title including the playback of other various content data such as director's commentary may be separately managed as a full profile title.

The above titles can be recorded and managed in the TITLE directory which is additionally allocated to the BD-  
20 ROM file structure. For instance, in FIG. 4, a BD-ROM directory is placed under the Root directory, and the TITLE directory is placed under the BD-ROM directory. A title file of the file name 010001.vts is recorded and managed in the TITLE directory.

25 Management information contained and recorded in the title file 01001.vts can include user interface application information UIAppInfTitle, a title segment table TableOfTitleSegment, and so forth. A Title Segment 1 contained in the TableOfTitleSegment can include a PlayList  
30 Pointer, playlist pre-commands PL Pre-CMDs, PL Post-CMDs, and play item commands PI-CMDs corresponding to play items in the corresponding playlists.

Meanwhile, the PlayList Pointer is information for

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association with a specific playlist, for example, the  
PlayList 1 of the plurality of playlist files (\*.rpls or  
\*.vpls) recorded in the PLAYLIST directory, as shown in FIG.  
4. A playlist file name or a playlist number can be  
5 recorded in the PlayList Pointer.

The PL Pre-CMDs is initial setting information for  
the playback of the A/V data corresponding to the PlayList  
1. The PL Post-CMDs is recorded and managed to set the  
reset or the next playback path when the reproduction of  
10 the A/V data corresponding to the PlayList 1 is completed.

One title segment may be associated with one playlist  
or a plurality of playlists. In the latter case, another  
playlist pointer is additionally included and recorded.

The play items contained in the playlist are  
15 associated with the clip information files (\*.clpi),  
respectively, recorded in the CLIPINF directory. The clip  
information files are associated with the clip files  
(\*.m2ts) recorded in the STREAM directory.

Accordingly, the BD-ROM according to an embodiment of  
20 the present invention places the BD-ROM directory under the  
Root directory, and records and manages the PLAYLIST  
directory, the CLIPINF directory, and the STREAM directory  
under the BD-ROM directory. In addition, the new TITLE  
directory is additionally allocated to record and manage  
25 the title files (\*.vts) therein.

VTSI information recorded in the title file includes  
the UIAppInfoTitle information and the TableOfTitleSegment  
information as described earlier in reference to FIG. 4. In  
the TableOfTitleSegment information, the respective title  
30 segments are included and recorded.

Each segment is associated with one or more playlist  
files. By way of example, as shown in FIG. 5, the Segment 2  
is associated with the PlayList 2, and the plurality of



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PlayItems recorded in the PlayList 2 are associated with the clip information files (\*.clpi), respectively, recorded in the CLIPINF directory.

5 The clip information files are associated with the clip files (\*.m2ts) recorded in the STREAM directory. Accordingly, the optical disc device, which includes an optical pickup 11, a video disc play (VDP) system 12, a micom 13, and a memory 14 as shown in FIG. 6, is able to read and reproduce the A/V streams of the clip files in the  
10 diverse playback orders in reference to the segments recorded in the title files. For instance, the optical disc device accesses the corresponding PlayList based on the PlayList Pointer recorded in the Title Segment.

15 The optical disc device carries out the initial setup operation in reference to the PL Pre-CMDs recorded in the Title Segment, and then reproduces the A/V stream of the clip file ultimately associated to the PI-CMDs. Next, the optical disc device reproduces a series of the multi-titles selectively referring to the next playback path or the  
20 Title Segment of the branch structure, based on the PL Post-CMDs.

In the TITLE directory, a Core Profile title file for reproducing the general A/V data is recorded and managed together with a Full Profile title file including the  
25 playback of diverse content data. Alternatively, a separate TITLE directory, for example, a FULLTITLE directory is additionally allocated to separately manage the Core Profile title file and the Full Profile title file.

30 Under the BD-ROM directory, a CONTENTS directory is additionally allocated to record and manage various content files such as director's commentary, for the Full Profile title file. Besides, management information for the association with the content files is additionally recorded

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in the Full Profile title file. Thus, the reproductions of the general A/V stream and the various content data can be performed simultaneously.

Navigation information is recorded and managed to perform the random/shuffle playback with respect to the titles which are recorded and managed as above. According to one embodiment of the present invention, as shown in FIG. 7, the navigation information to control the random/shuffle playback, for example, random/shuffle information R/S\_Info is recorded and managed in the Title 1 including the plurality of Segments 1, 2, and 3.

The segments in the title file can be associated with one or more playlists. By way of example, the Segment 1 is associated with the PlayList 1 and the PlayList 2, the Segment 2 is associated with the PlayList 3, and the Segment 3 is associated with the PlayLists 4, 5 and 6.

The R/S\_Info includes the playback order information relating to the segments. When executing the random/shuffle playback according to a user's request, the optical disc device retrieves the PlayLists 1 and 2 associated with the Segment 1 by referring to the R/S\_Info and reproduces the data stream corresponding to the PlayLists 1 and 2.

Next, the PlayLists 4 through 6 associated with the Segment 3 are retrieved by referring to the R/S\_Info, and the data streams corresponding to the PlayLists 4 through 6 are read out and reproduced. The PlayList 3 associated with the Segment 2 is retrieved by referring to the R/S\_Info, and the data stream corresponding to the PlayList 3 is read out and reproduced. As such, a series of random/shuffle playback operations is carried out. At this time, a Loop Element which performs the random/shuffle playback is the PlayList.

According to another embodiment of the present

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invention, a certain Segment 1 or a Title 1 including the Segment 1 manages the R/S\_Info, as shown in FIG. 8.

The certain segment may include one or more playlists or a plurality of random/shuffle units RSU 1, 2, and 3 associated with part of the playlists. For instance, the RSU 1 is associated with the entire PlayList #1, the RSU 2 is associated with part of the PlayList # 1 and the PlayList #2, and the RSU 3 is associated with part of the PlayList #2.

The R/S\_Info contains playback order information relating to the RSUs. When executing the random/shuffle playback according to a user's request, the optical disc device retrieves the PlayList #1 associated with the RSU 1 by referring to the R/S\_Info included in the title file or the segments, reads and reproduces the data stream corresponding to the PlayList #1.

Next, the data stream corresponding to part of the PlayList #2 associated with the RSU 3 is read out and reproduced by referring to the R/S\_Info. The data streams corresponding to part of the PlayLists #1 and #2 associated with the RSU 2 are read out and reproduced by referring to the R/S\_Info. As such, a series of random/shuffle playback operations is carried out. At this time, a Loop Element which performs the random/shuffle playback is the RSU.

According to still another embodiment of the present invention, R/S\_Infor for controlling the random/shuffle playback is recorded and managed in a Title 1 associated with a plurality of PlayLists 1, 2, and 3, as shown in FIG. 9.

The playlists associated with the title file can be associated with play items. For example, the PlayList 1 is associated with PlayItems 1 and 2, the PlayList 2 is associated with a PlayItem 3, and the PlayList 3 is

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associated with PlayItems 4, 5, and 6.

The R/S\_Info includes playback order information relating to the playlists. When executing the random/shuffle playback according to a user's request, the optical disc device retrieves the PlayItems 1 and 2 associated with the PlayList 1 by referring to the R/S\_Info, reads and reproduces the data streams corresponding to the PlayItems 1 and 2.

Next, the PlayItems 4 through 6 associated with the PlayList 3 are retrieved by referring to the R/S\_Info, and the data streams corresponding to the PlayItems 4 through 6 are read out and reproduced. The PlayItem 3 associated with the PlayList 2 is retrieved by referring to the R/S\_Info, and the data stream corresponding to the PlayItem 3 is read out and reproduced. As such, a series of random/shuffle playback operations is carried out. At this time, a Loop Element which performs the random/shuffle playback is the PlayItem.

According to yet another embodiment of the present invention, R/S\_Info is recorded and managed in a certain PlayList 1 or a Title 1 associated with the certain playlist, as shown in FIG. 10.

The certain playlist can include one or more random/shuffle marks RS\_Marks. The RS\_Mark is information to access a specific recording area in the data stream associated with the playitem. For example, RS\_Mark 1 recorded in the PlayList 1 corresponds to the head of a PlayItem #1, a RS\_Mark 2 corresponds to the midpoint of the PlayItem #1, and a RS\_Mark 3 corresponds to the midpoint of a PlayItem #2.

The R/S\_Info includes playback order information relating to the RS\_Marks. When executing the random/shuffle playback according to a user's request, the optical disc

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device retrieves and reproduces the data stream of the head of the PlayItem #1 corresponding to the RS\_Mark 1 by referring to the R/S\_Info recorded in the title file or the playlist.

5       Next, the data stream at the midpoint of the PlayItem #2 corresponding to the RS\_Mark 3 is retrieved and reproduced by referring to the R/S\_Info. In addition, the data stream at the midpoint of the PlayItem #1 corresponding to the RS\_Mark 2 is read and reproduced by  
10       referring to the R/S\_Info. As such, a series of random/shuffle playback operations is carried out. At this time, a Loop Element performing the random/shuffle playback is the R/S\_Mark.

15       Although a few embodiments of the present general inventive concept have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the general inventive concept, the scope of which is defined in the appended claims and their  
20       equivalents.

**Effect Of The Invention**

As set forth above, the title management and playback method of the high density optical disc according to the  
25       present invention, records and manages the title files associated with the clip files of the data stream recorded and stored in the high density optical disc such as BD-ROM, and also records and manages the navigation information for the random or shuffle playback of the title files.  
30       Therefore, the data stream of the title files recorded and managed on the high density optical disc can be variously reproduced through the random/shuffle playback.



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**What is claimed is:**

1. A title management method of a high density optical disc, the method for recording and managing a title file associated with clip files of a data stream recorded and stored on the high density optical disc, and recording and managing navigation information for a random or shuffle playback of the title file.

2. The title management method as in claim 1, wherein the navigation information is information for a random or shuffle playback of a plurality of segments which are managed separately from playlist files associated with the clip files, and the navigation information is recorded and managed in the title file.

3. The title management method as in claim 1, wherein the navigation information is information for a random or shuffle playback of random/shuffle units which correspond to all or part of playlist files associated with the clip files, and the navigation information is recorded and managed in the segments which are managed separately from the playlist files, or in the title file.

4. The title management method as in claim 1, wherein the navigation information is information for a random or shuffle playback of playlist files associated with the clip files, and recorded and managed in the title file.

5. The title management method as in claim 1, wherein the navigation information is information for a random or shuffle playback of random/shuffle marks which correspond to specific positions of a play item in a playlist file associated with the clip files, and the navigation



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information is recorded and managed in the playlist file or the title file.

5       6. A high density optical disc which stores a title file associated with clip files of a data stream recorded and stored on the high density optical disc, and navigation information for a random or shuffle playback of the title file.

10       7. The high density optical disc as in claim 6, wherein the navigation information is information for a random or shuffle playback of a plurality of segments which are managed separately from playlist files associated with the clip files, and the navigation information is recorded  
15 in the title file.

      8. The high density optical disc as in claim 6, wherein the navigation information is information for the random or shuffle playback of random/shuffle units which  
20 correspond to all or part of playlist files associated with the clip files, and the navigation information is recorded and managed in the segments which are managed separately from the playlist files, or in the title file.

25       9. The high density optical disc as in claim 6 wherein the navigation information is information for a random or shuffle playback of playlist files associated with the clip files, and recorded and managed in the title file.

30       10. The high density optical disc as in claim 6 wherein the navigation information is information for a random or shuffle playback of random/shuffle marks which

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correspond to specific positions of a play item in a playlist file associated with the clip files, and the navigation information is recorded in the playlist file or the title file.

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11. A title playback method of a high density optical disc, comprising:

10 a first operation of reading and confirming navigation information for a random or shuffle playback of a title file on the high density optical disc; and

a second operation of performing the random or shuffle playback of a data stream of the title file by referring to the navigation information.

15 12. The title playback method as in claim 11, wherein the second operation performs a random or shuffle playback of a plurality of segments which are managed separately from playlist files associated with clip files, by referring to the navigation information read from the title  
20 file.

13. The title playback method as in claim 11, wherein the second operation performs a random or shuffle playback of random/shuffle units which correspond to all or part of  
25 playlist files associated with clip files, by referring to the navigation information read from a segment, which is managed separately from the playlist files, or the title file.

30 14. The title playback method as in claim 11, wherein the second operation performs a random or shuffle playback of playlist files associated with clip files by referring to the navigation information read from the title file.

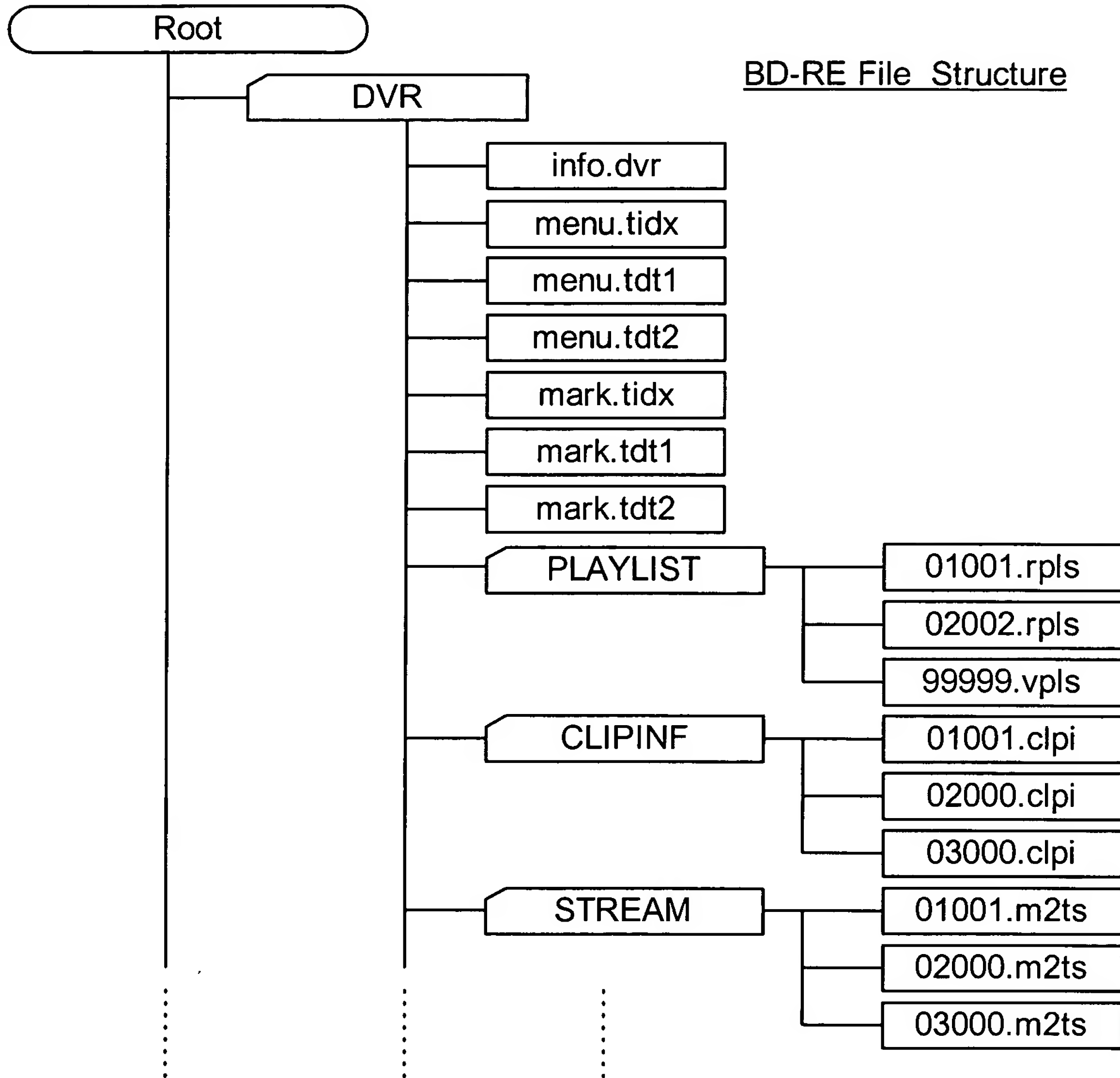
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15. The title playback method as in claim 11, wherein  
the second operation performs the random or shuffle  
playback of random/shuffle marks which correspond to  
5 specific positions of a play item in a playlist file  
associated with clip files, by referring to the navigation  
information read from the playlist file or the title file.



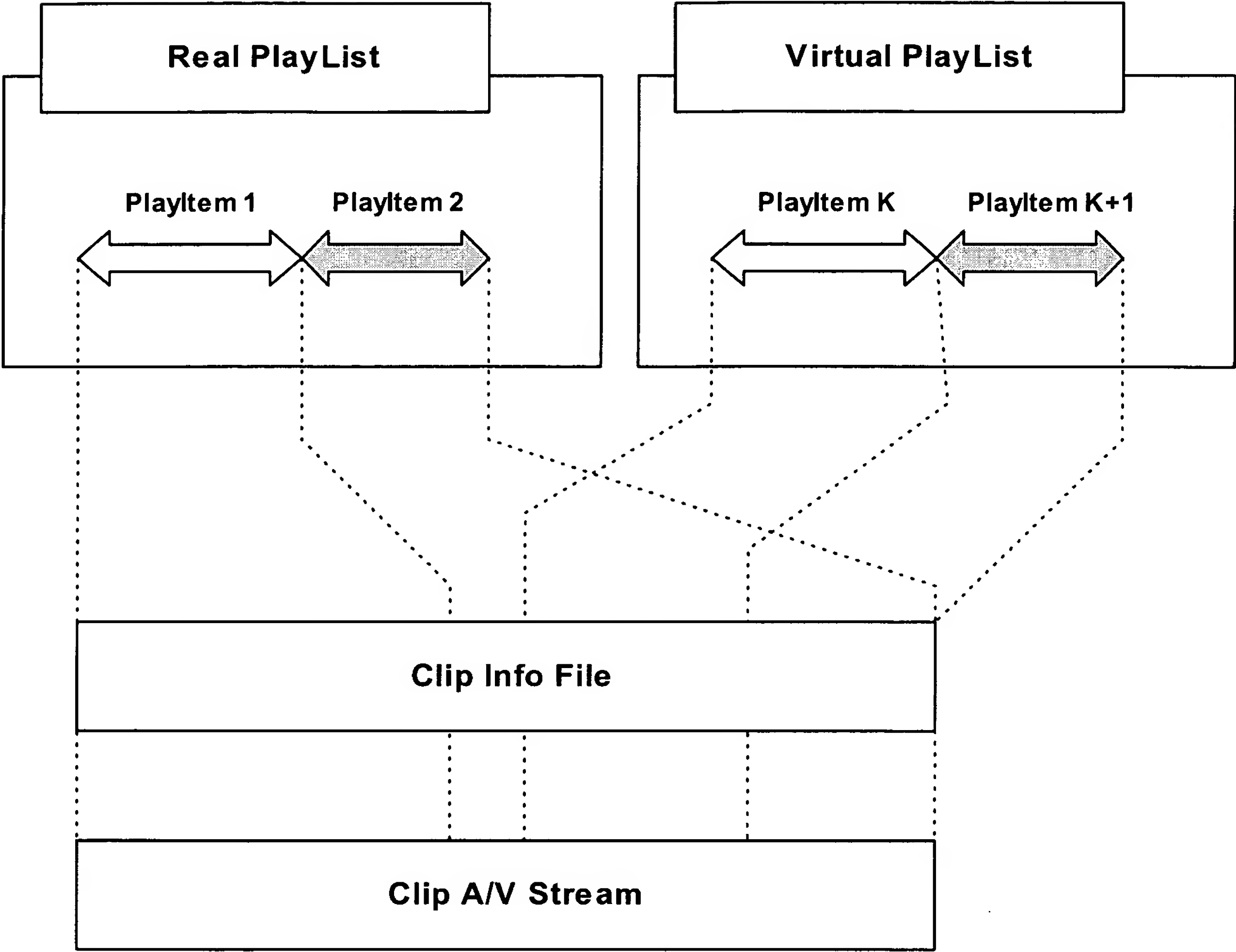
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**FIG. 1**





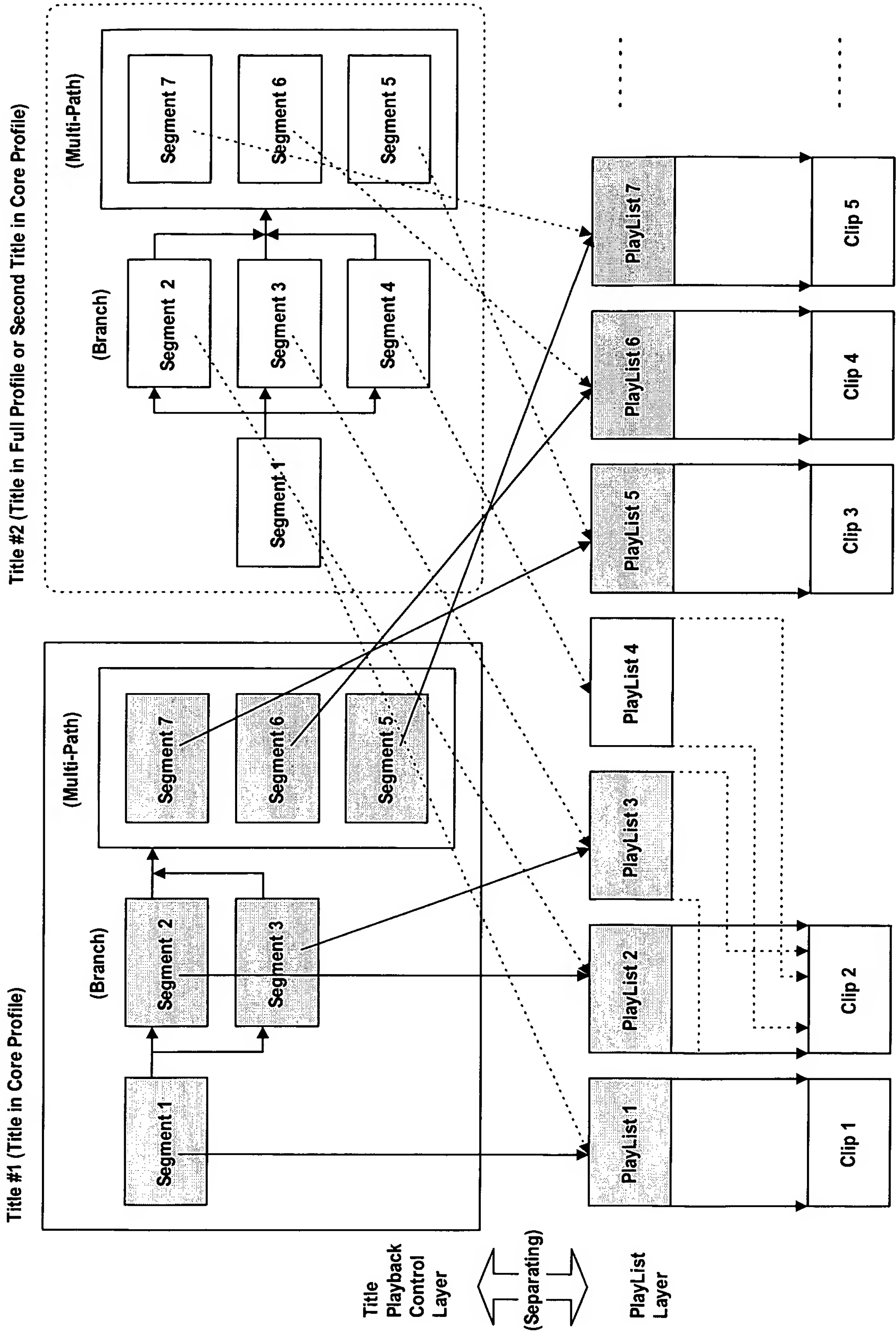
**FIG. 2**





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FIG. 3





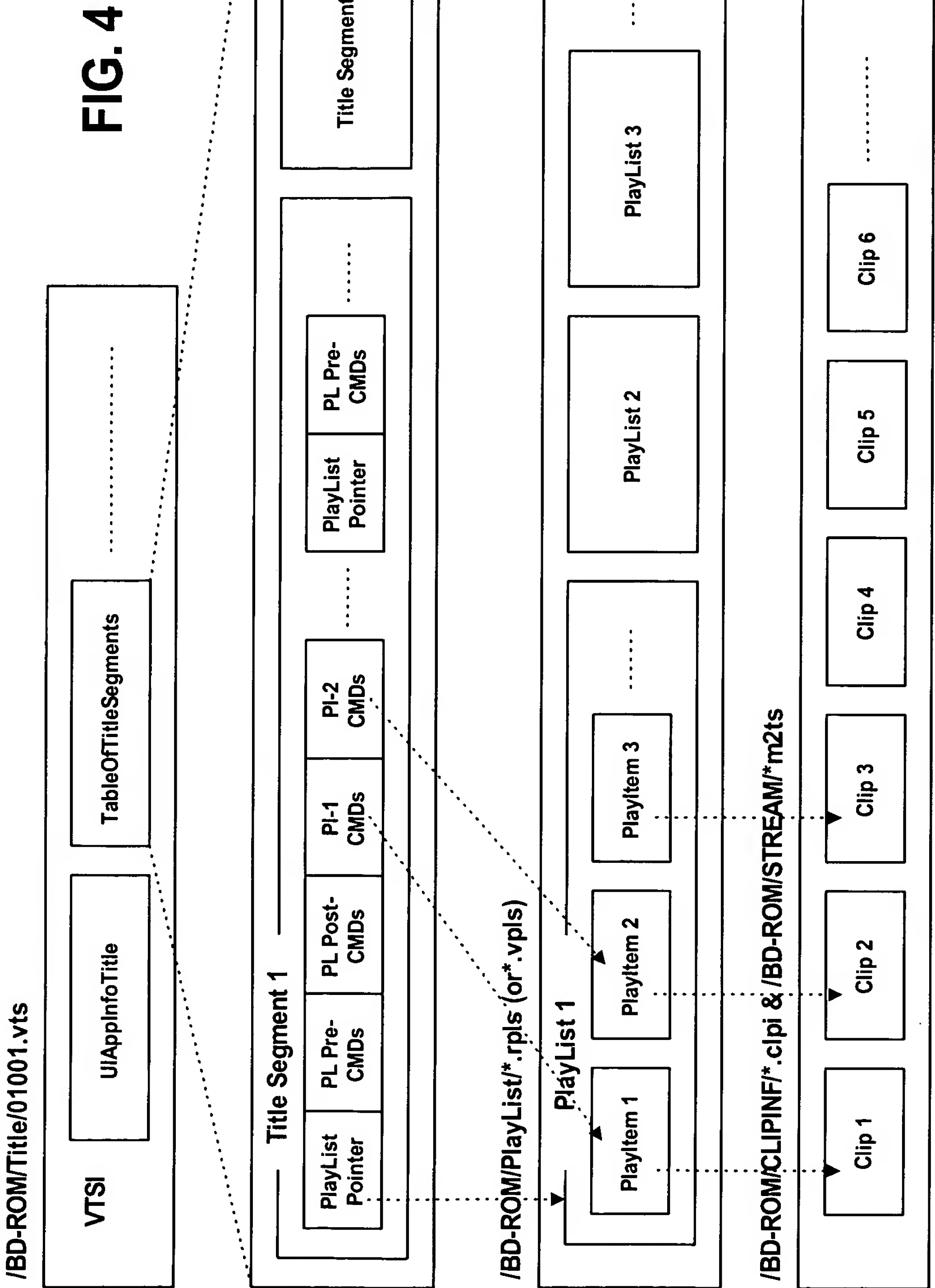
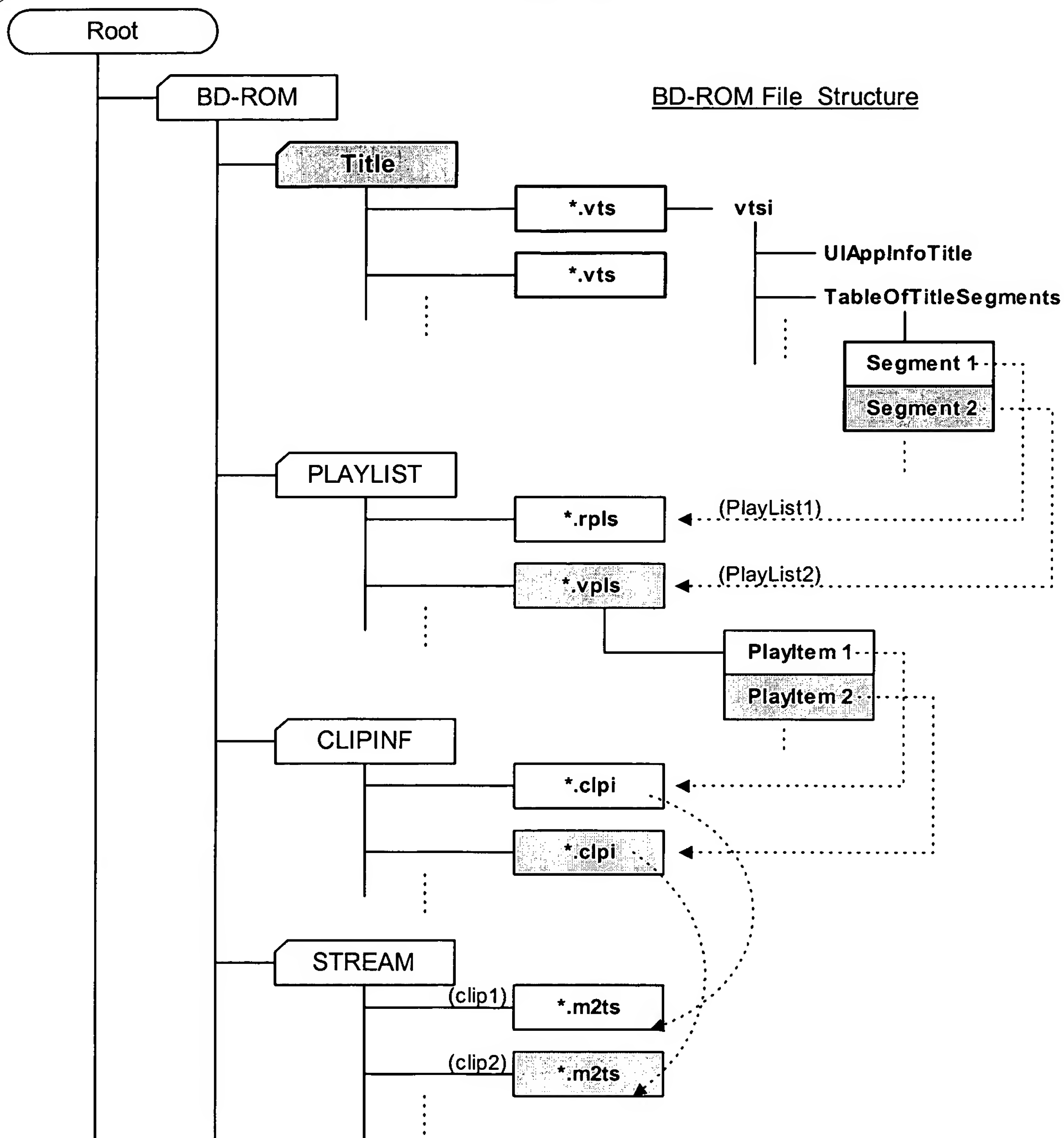




FIG. 5





**FIG. 6**

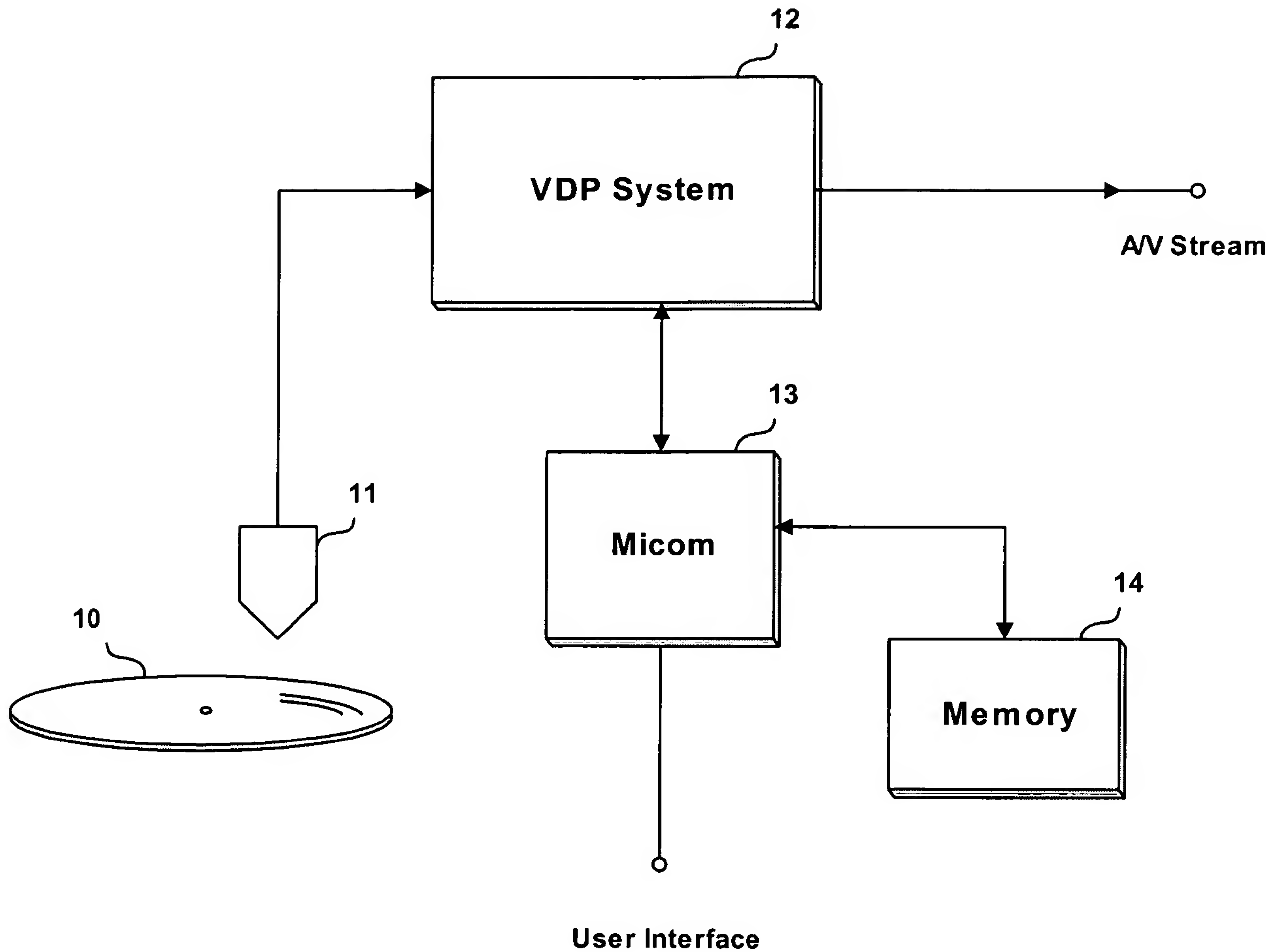




FIG. 7

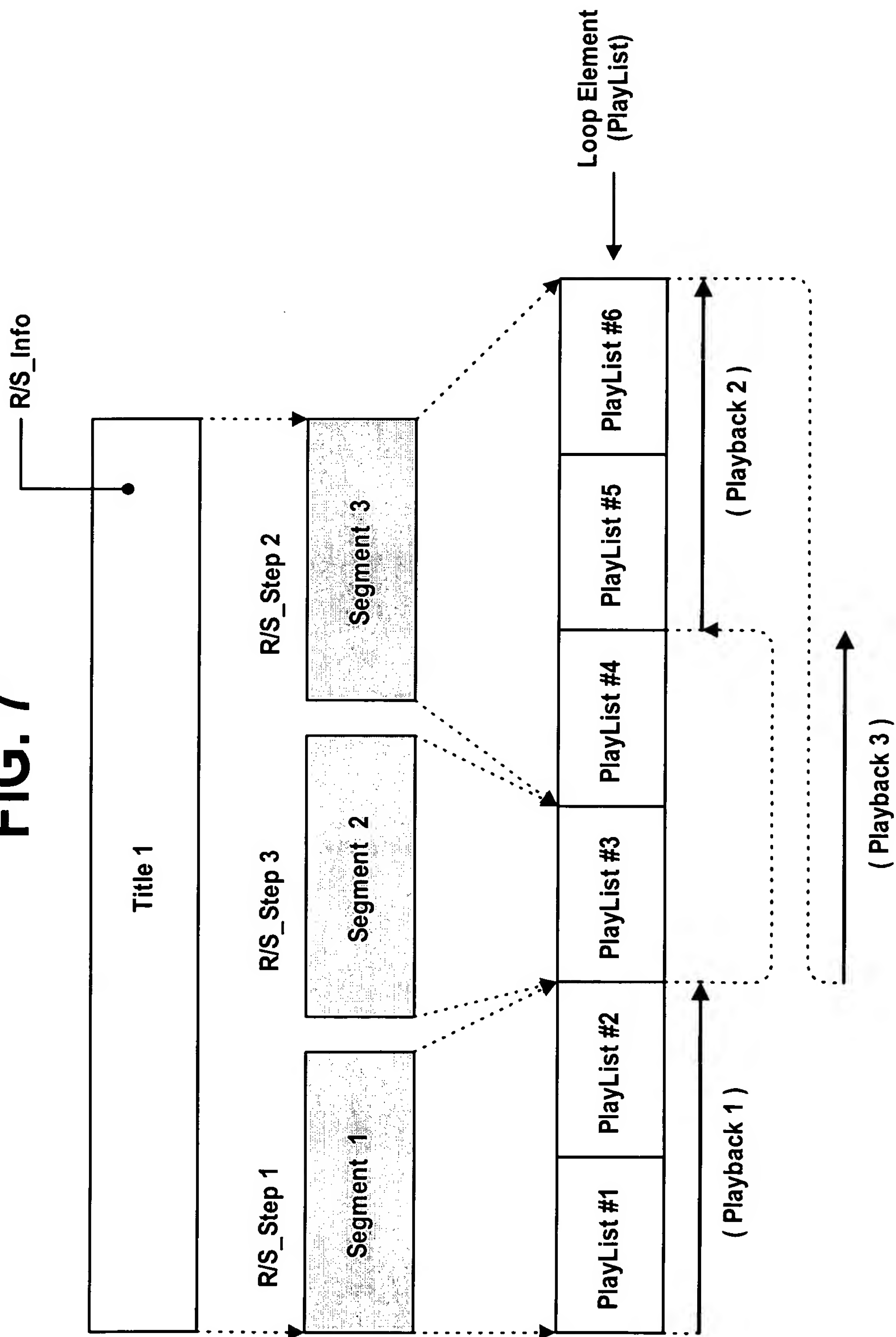




FIG. 8

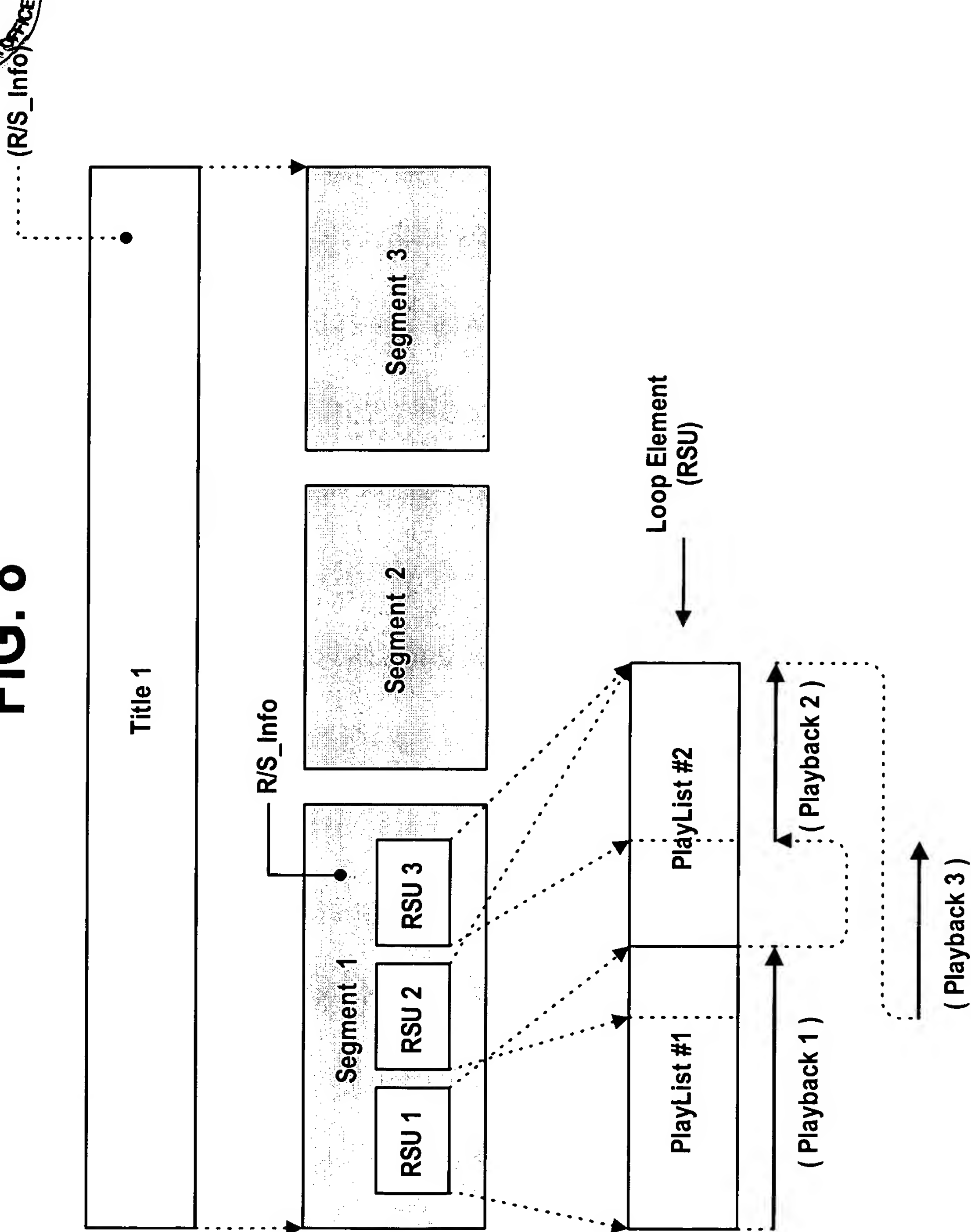




FIG. 9

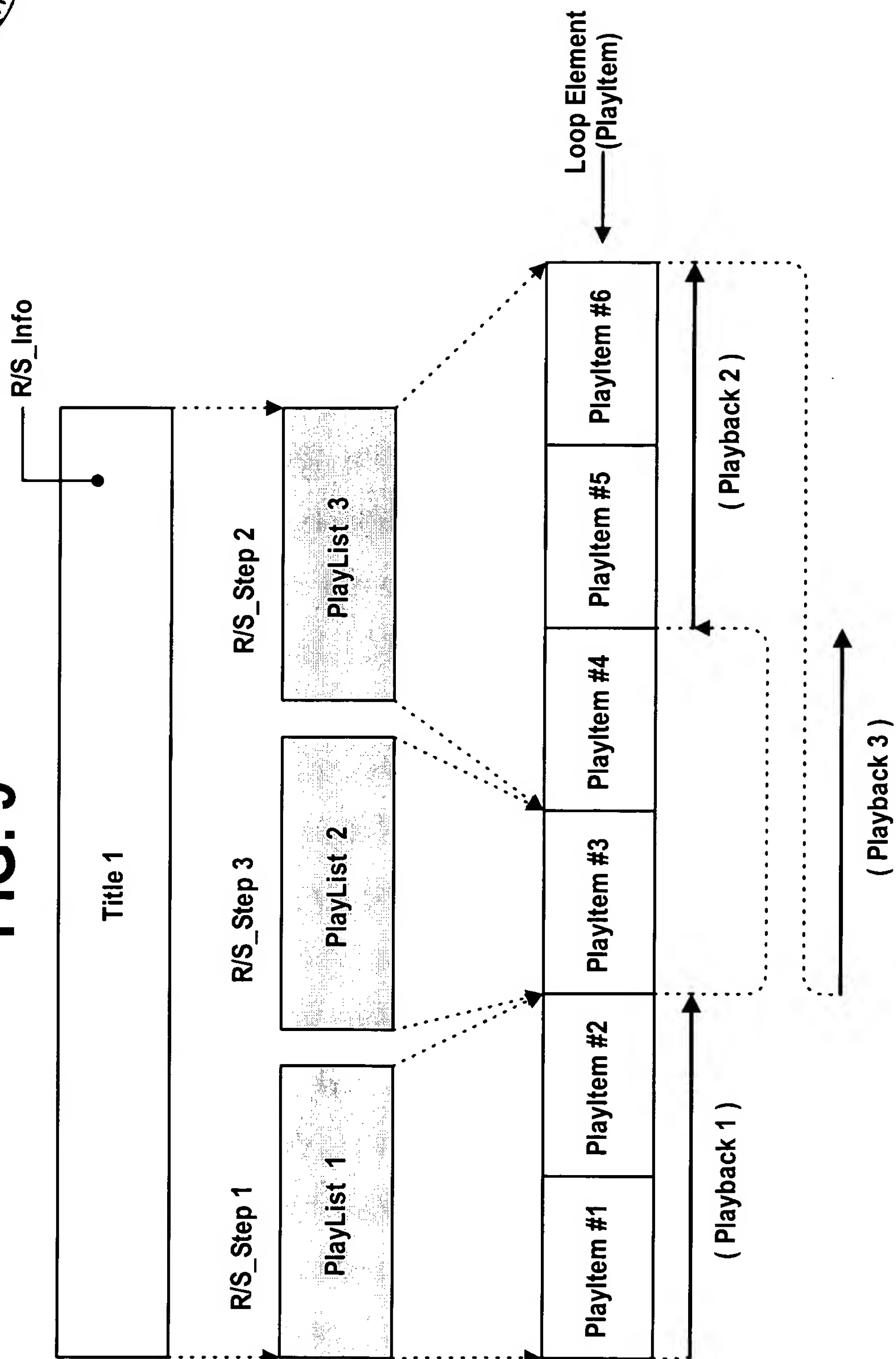






FIG. 10

